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E1D
Selected US specifications from IPC sub-class
E04C

(54) Reinforcement spacer for concrete reinforcement grids

(57) Spacers for use in producing reinforced concrete structures, and particularly for locating the reinforcing bars or grids in position relative to shuttering prior to the casting of concrete, comprise a body 1 of an inorganic material and a clip 2 by which the body may be mounted on the reinforcement. The clip allows easy and quick mounting of the spacer in position avoiding the need for "wiring of".

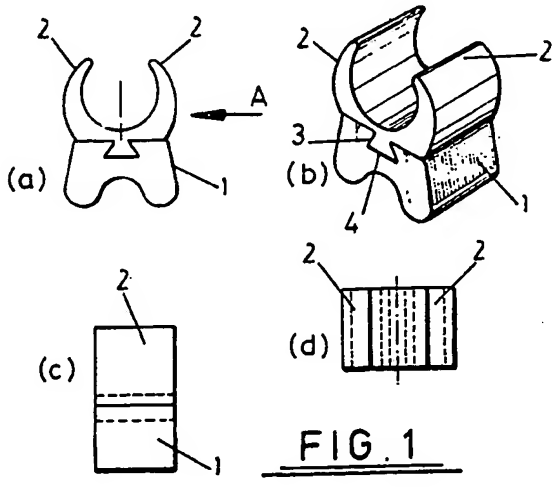

FIG. 1

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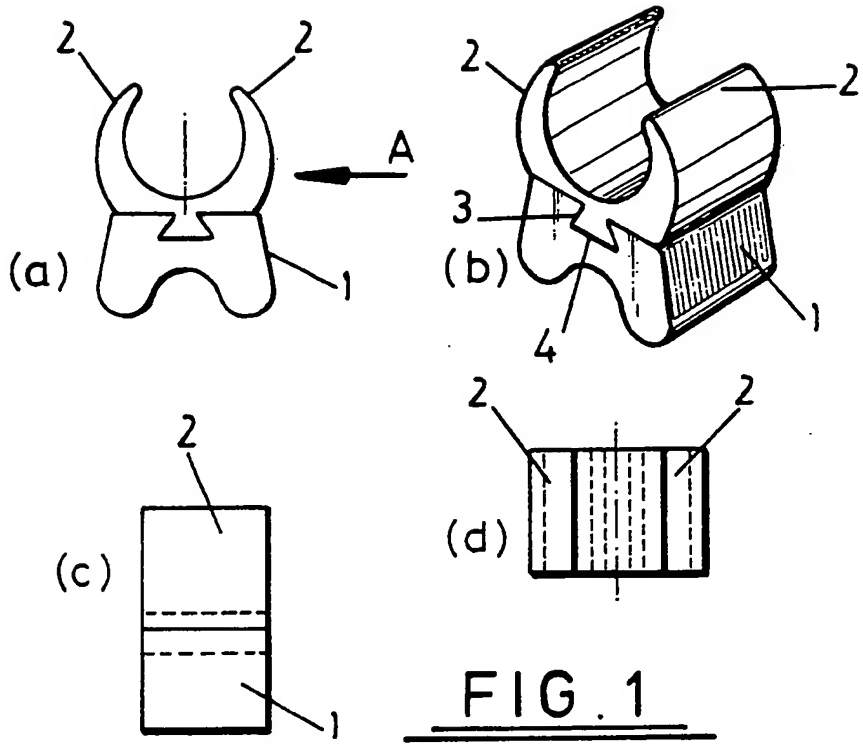

FIG. 1

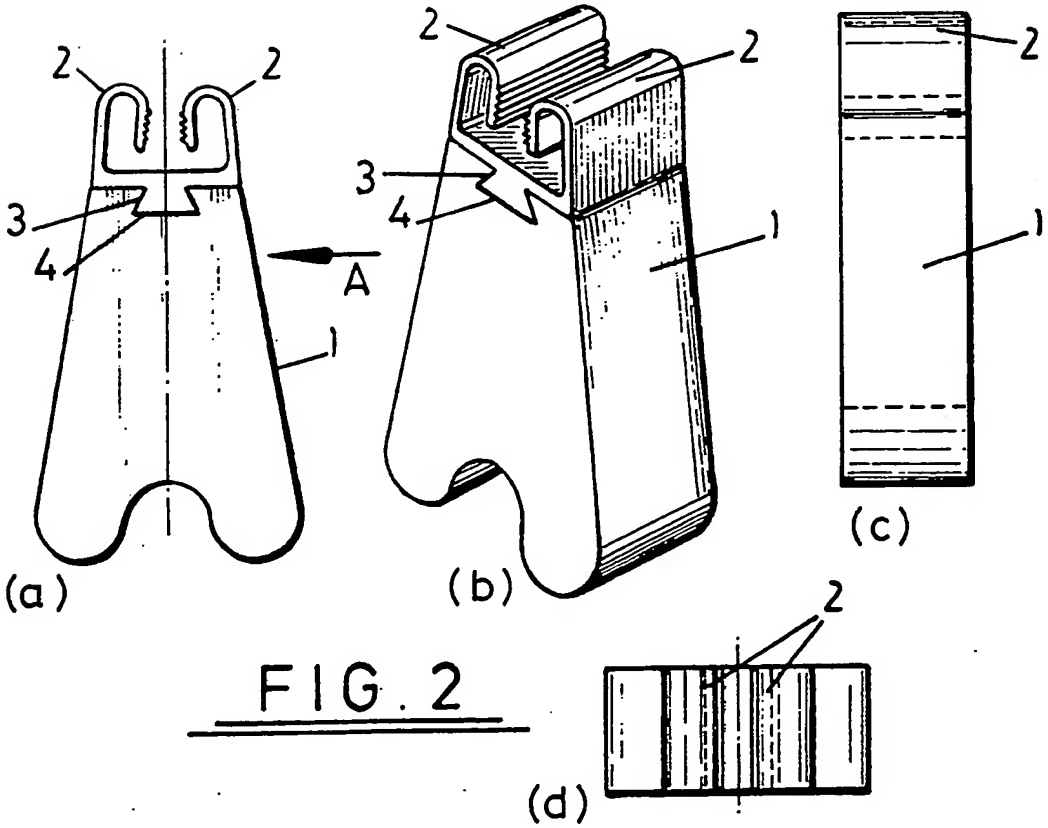

FIG. 2

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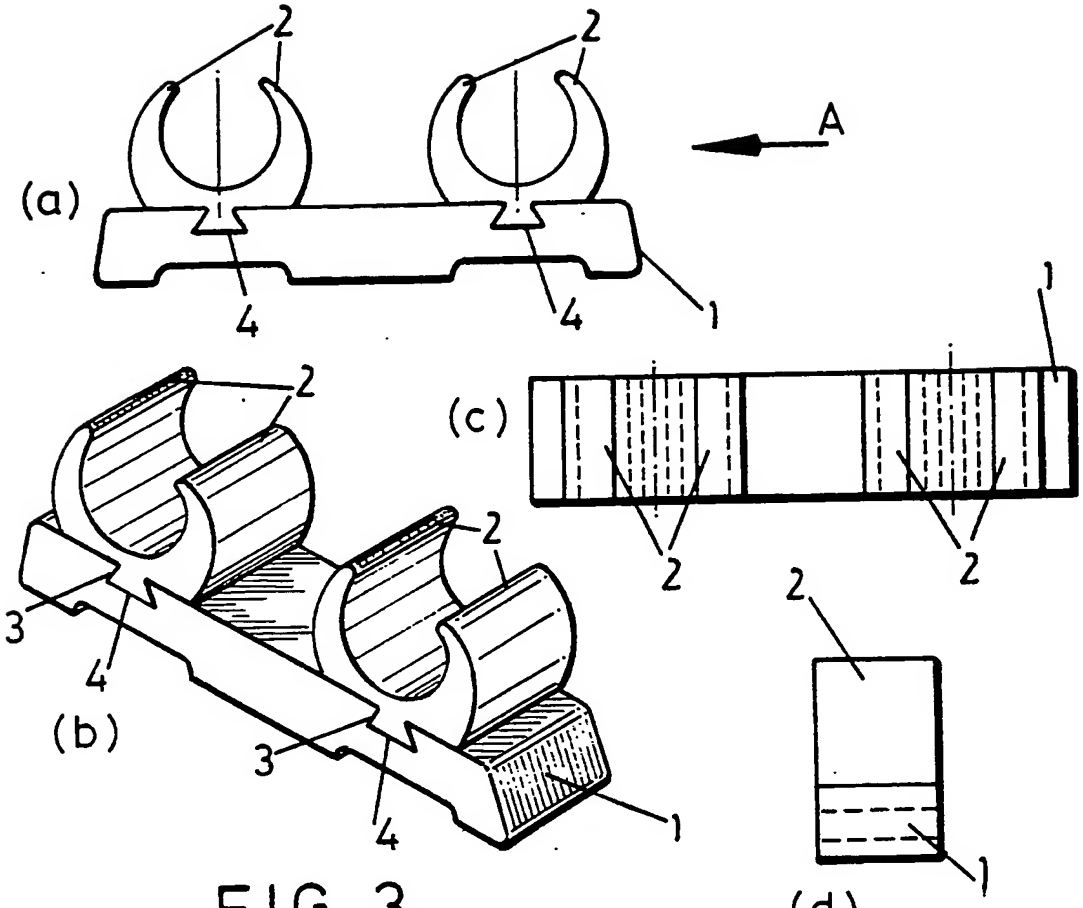

FIG. 3

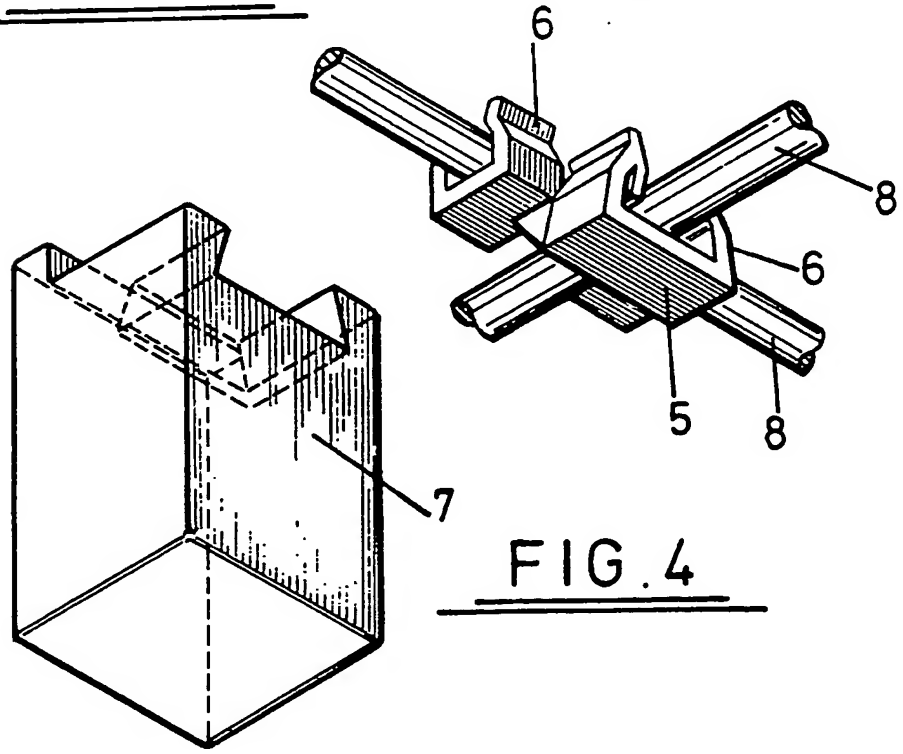

FIG. 4

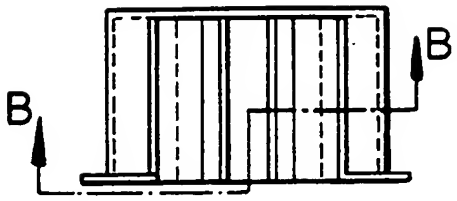

FIG.5a

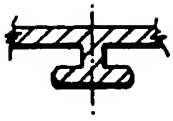

FIG.5d

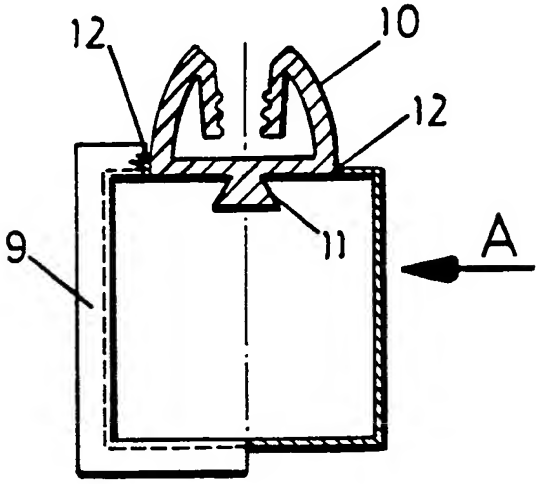

FIG.5a

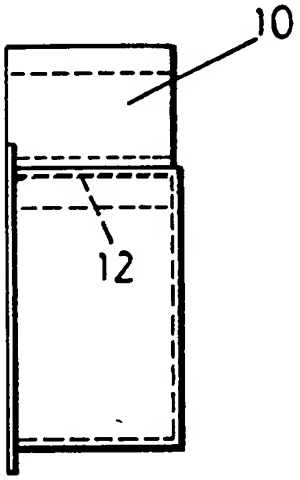

FIG.5c

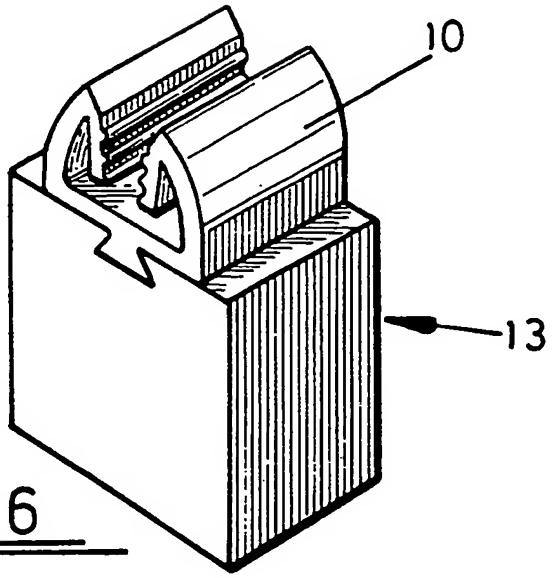

FIG.6

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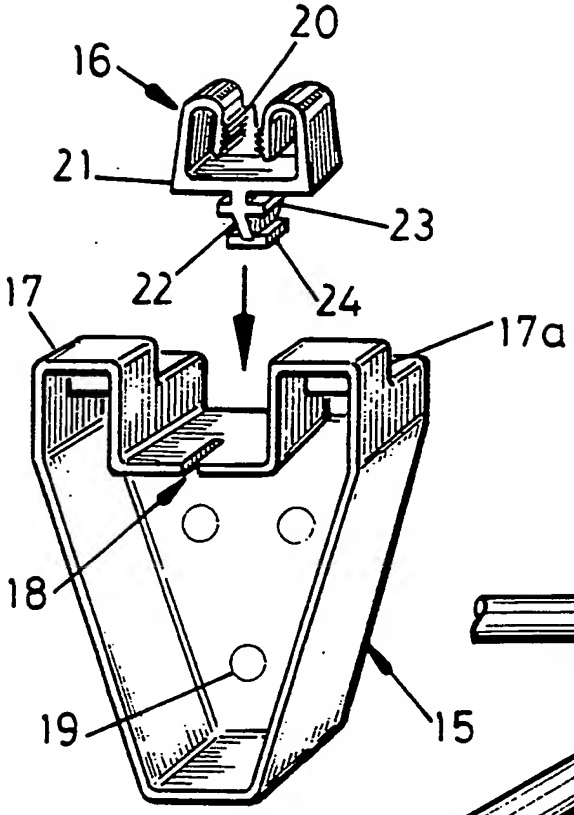

FIG 7a

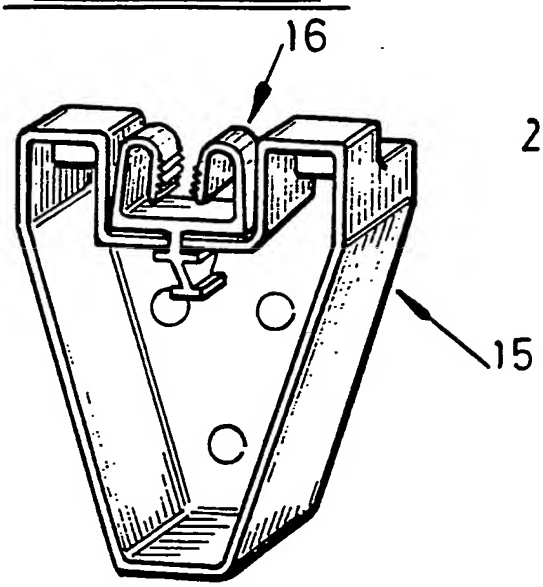

FIG.7b

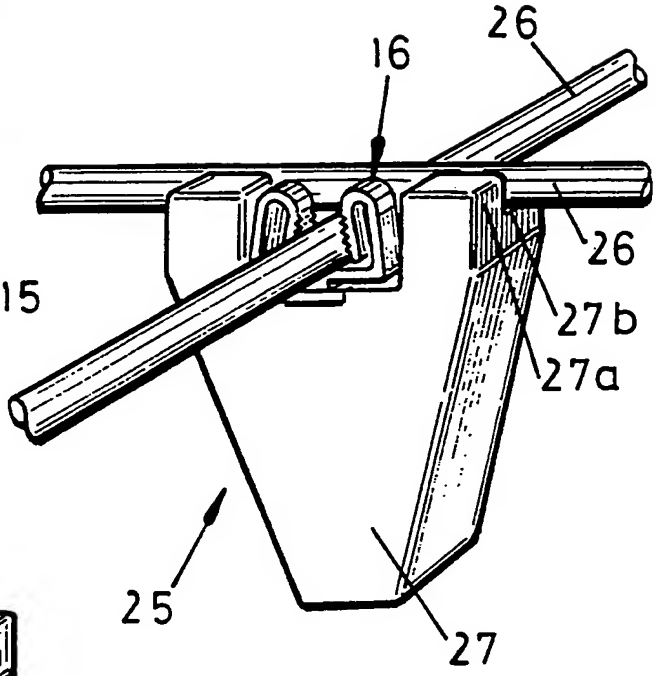

FIG.7c

IMPROVEMENTS IN OR RELATING TO SPACERS

The present invention relates to spacers as used in the building and construction industries.

Spacers are used in the building and construction industries particularly (but not exclusively) in the production of reinforced concrete structures. More particularly, the spacers are used for locating metal reinforcing bars or grids in the desired position (particularly with respect to the shuttering) prior to the pouring of the concrete. Such spacers are generally made of an inorganic material e.g., concrete or other cementitious material, and remain in the reinforced concrete structure.

It is general practice to attach the spacer to the reinforcing bar or grid by a short length of wire which thus also remains in the reinforced concrete. However, this method has two principal disadvantages. Firstly, the wire must be threaded through the spacer and round the bar (or grid) before the ends of the wire are twisted together. This is a time consuming operation. Secondly, this wire could give rise to a corrosion point in the concrete structure.

It is an object of the present invention to obviate or mitigate the abovementioned disadvantages.

According to the present invention there is provided a spacer for use in positioning a reinforcing bar or grid, the spacer comprising a body (preferably of an inorganic material) and a clip mounted on the body for locating the spacer on the bar or grid.

The invention also provides a method of

producing a reinforced concrete structure, the method comprising locating the reinforcement in position by means of at least one spacer as defined in the preceding paragraph, the spacer being mounted on the reinforcement by said clip, and casting the concrete.

The use of a clip allows the spacer to be mounted quickly and easily on the reinforcing bar. Additionally, the invention allows the clip to be of a material, e.g. plastics, which does not deleteriously affect the reinforced concrete.

Preferably the clip has a pair of resilient jaws by which it may be mounted on the bar or grid. Preferably the clip comprises a base portion, a pair of fingers provided on one side of the base portion and a pair of tongues each integral with a respective one of the fingers at the end thereof remote from the base portion, the said tongues extending back towards the base and defining the pair of resilient jaws.

The clip may be manufactured separately from the spacer prior to the composite unit being supplied to the building or construction site. For example, the clip may have a dove-tail tenon formation and the spacer may be produced with a complementary dove-tail section groove in which the tenon may be located.

Alternatively, the spacer may be formed in situ with the clip so that a separate stage of assembling the spacer and clip is not required. In this case, the spacer may be produced in a plastics mould having an internal anchor formation and an external clip formation connected to said anchor formation through a wall of the mould. Lines of weakness are provided in the wall of the mould adjacent the clip and anchor formation. The spacer is produced by introducing curable inorganic material, particularly a hydraulic

concrete (eg. cement or other cementitious material) into the mould and allowing it to cure. The mould may then be stripped away from around the spacer, this process being facilitated by the lines of weakness in the wall of the mould. This technique thus produces a spacer with a clip anchored in the body of the spacer. The technique also has the advantage that the mould may be formed by injection moulding which allows the production of comparatively complex shapes for the clip formation. The mould may be of thermoplastics material which can be recycled after it has been stripped from the concrete spacer.

In an alternative method of producing the spacer in situ with the clip, there is used a mould with a slot in one side face thereof, the slot extending from the top edge of the side face (at which the slot is open) towards the base of the mould. The base of the mould will have a number of small apertures through which ejector pins or the like may be inserted.

In this embodiment, the clips and mould are produced as separate items, although it should be appreciated that the separate clips and mould may be produced in the same cycle of an injection moulding machine. The clips comprise integral clip and anchor formations connected by a region (the 'neck' region) which is of a thickness corresponding to the width of the slot in the mould. To produce a spacer, the 'neck' region of a clip is inserted along the slot such that the clip formation is external of the mould and the anchor formation is within the mould. Concrete or the like may now be poured into the mould and allowed to harden. Seepage of the concrete from the mould is prevented by virtue of the 'neck' region

of the clip serving to close the slot in the side face of the mould.

Once the concrete has hardened, the spacer (with attached clip) may be ejected from the mould by inserting ejector pins or the like through the small holes in the base of the mould. It may be possible to the mould several times until it becomes indesirably soiled with residue concrete.

The invention will be further described by way of example only, with reference to the accompanying drawings, in which :

Figs. 1-3 diagrammatically illustrate several embodiments of spacer and clip;

Fig. 4 illustrates a further embodiment of spacer and associated clip;

Fig. 5a-5c illustrate a mould for producing a spacer in situ with a clip, and

Fig. 6 illustrates the spacer and clip assembly formed with the mould of Fig. 5.

Figs. 7a-d illustrate a further mould and a spacer produced therewith.

Figs. 1, 2 and 3 each show different embodiments of concrete spacer 1 and plastics clip 2 for mounting the spacer 1 on reinforcement bars (not shown). Each of Figs. 1-3 includes four views (a)-(d) of the respective spacer. These views are as follows:

(a) face-on view,
(b) isometric view
(c) view on arrow A in (a)
(d) plan view.

Each spacer 1 has a dove-tail section groove 3 in which a complimentary tenon 4 of the clip 2

locates. The clips 2 are interchangeable so that a range of spacer 1/clip 2 combinations may be assembled to suit the particular application.

The plastics clip 5 shown in Fig. 4 has two jaws 6 at right angles to each other and, as in Fig. 1, is mounted on a spacer 7 by a dove-tail arrangement. The clip 5 is intended for use in mounting the spacer 7 at the intersection of two wires 8 (at right angles to each other) in a reinforcing mesh, as indicated.

Figs. 5a-c show various views of a mould 9 for forming a concrete spacer in situ with a clip. Fig. 5a is a side view of the mould, Fig. 5b is a view on the line B-B of Fig. 5a, and Fig. 5c is a view on arrow A of Fig. 5c. The mould is open-topped and one of its side walls is integral with a clip formation 10 (on the exterior of the mould) and also with an anchor formation 11 (provided on the interior of the mould). Moulded in lines of weakness 12 are formed in the side of the mould along the edge of the clip 10.

To produce the spacer, concrete is poured into the mould 9 and allowed to cure. The mould 9 may then be stripped away along the lines of weakness 12 to leave the composite spacer/clip 13 illustrated in Fig. 6.

Fig. 5d shows an alternative to the dove-tail 11 illustrated in Fig. 5b.

Figs 7(a) and (b) illustrate an alternative moulding arrangement comprised of an open topped mould 15 and clip 16.

Mould 15 and clip 16 are made of the same thermoplastic material and, for economy, may be moulded together on the same die which may be multiple cavity to make several sets at once.

Mould 16 is generally trapezoidol and has one wall formed with spaced wings 17 with shoulders 17a intermediate their depth. Between wings 17, a slot 18 is formed in the mould wall. The base of the mould is formed with three circular 'weak points' 19 at which the plastics material is of substantially reduced thickness compared to the remainder of the base. These weak points are for facilitating removal of the spacer from the mould as described below.

Clip 16 has a pair of resilient jaws 20, for gripping a reinforcing bar, provided on one side of a plate-like portion 21 of the clip. An anchor formation is provided on the opposite side of plate portion and includes a stem 22 on which are projections 23 and 24. Projections 23 are spaced from plate 21 by a distance corresponding to the wall thickness of mould 15, and stem 22 has a thickness corresponding to the width of slot 18. Thus the stem 22 may be inserted into slot 18 such that projections 23 lie against the inside of the mould wall. A concrete light seal is thus formed between mould 15 and clip 16.

Concrete may now be introduced into mould 15 and allowed to set.

Removal of the spacer from the mmould is effected by ejection pins (not shown) which are passed through the weak points 19 in the base of the mould.

The finished spacer 25 is illustrated in Fig. 7c in which it is shown as being mounted by the clip 16 at the intersection of two reinforcing bars 26. The body portion 27 of the spacer has, of course, a shape complimentary to that of the mould and it will be seen that the positioning of the clip 16 between the

wings 27a of the spacer, together with the provision of the shoulders 27b allow the spacer to be located close to the intersection.

The method of moulding the spacer as described with reference to Figs. 7a-c has the advantage that for a given size of mould 15 (and thus space body) it is possible to use a range of different sizes of clip 16. Thus a range of cover sizes, ie the distance by which the spacer must position the reinforcing bar clear of the ~~grid~~ shuttering, maybe catered for easily by simply choosing the appropriate clip 5. This flexibility is not available with the mould shown in Figs. 5a-c (in which the clip is formed integrally with the mould) since a range of cover sizes can only be catered for by having a corresponding range of the moulds and integral clips of the type shown in Fig 5a-c.

CLAIMS

1. A spacer for use in positioning a reinforcing bar or grid, the spacer comprising a body (preferably of an inorganic material) and a clip mounted on the body for locating the spacer on the bar or grid.

2. A spacer as claimed in claim 1 wherein the inorganic material is a cementitious material.

3. A spacer as claimed in claim 2 wherein the cementitious material is concrete.

4. A spacer as claimed in any one of claims 1 to 3 wherein the clip is of plastics material.

5. A spacer as claimed in any one of 1 to 4 wherein the clip has a tenon, for example of dove-tail configuration locating in a complimentary groove of the body.

6. A spacer as claimed in any one of claims 1 to 5 wherein a portion of the clip is securely embedded in the body.

7. A spacer as claimed in any one of claims 1 to 6 wherein the clip comprises a pair of reilient jaws.

8. A spacer as claimed in any one of claims 1 to 4 wherein the clip comprises a base portion, a pair of fingers provided on one side of the base portion, and a pair of tongues each integral with a respective one of the fingers at the end thereof remote from the base portion, the said tongues extending back towards the base and defining the pair of resilient jaws.

9. A spacer as claimed in any one of claims 1 to 8 wherein the body comprises a pair of wings between which the clip is located.

10. A spacer as claimed in claim 9 wherein eachwing has a shoulder intermediate the depth of the body.

11. A method of producing a spacer as claimed in claim 1 comprising introducing a curable inorganic material into a plastics mould having a clip formation external of the mould and an anchor formation internal of the mould connected to said clip formation through a wall of the mould, curing the inorganic material, and stripping the mould away from the cured material.

12. A method as claimed in claim 11 wherein the wall of said mould has lines of weakness adjacent the clip and anchor formation to facilitate the stripping of the mould.

13. A method of producing a spacer according to claim 1 comprising using a mould with a slot in one side face thereof, the slot extending from the top edge of the side face towards the base of the mould, inserting into the slot a portion of a clip having integral clip and anchor formation such that the anchor formation is within the mould and clip formation is external of the mould, introducing a curable inorganic material into the mould and curing said material, and removing the spacer from the mould.

14. A method as claimed in claim 13 wherein the base of the mould has at least one region of weakness through which ejector pins or the like are passed to eject the spacer from the mould.

15. A method as claimed in any one of claims 11 to 14 wherein the inorganic material is a hydraulic material.

16. A method as claimed in claim 15 wherein the

hydraulic material is a cementitious material, for example concrete.

17. A method as claimed in any one of claims 11 to 16 wherein the mould is of thermoplastics material.

18. A method of producing a reinforced concrete structure comprising locating at least some of the reinforcement in position (eg relative to shuttering) by means of at least one spacer as claimed in any one of claims 1 to 10, the spacer being mounted on the reinforcement by said clip, and casting the concrete.

19. A spacer for use in positioning a reinforcing bar or grid substantially as hereinbefore described with reference to any one of Figs 1-7.

20. A method of producing a spacer substantially as hereinbefore described with reference to any one of Figs. 1-7.

21. A method of producing a reinforced concrete structure substantially as hereinbefore described with reference to any one of Figs. 1-7.